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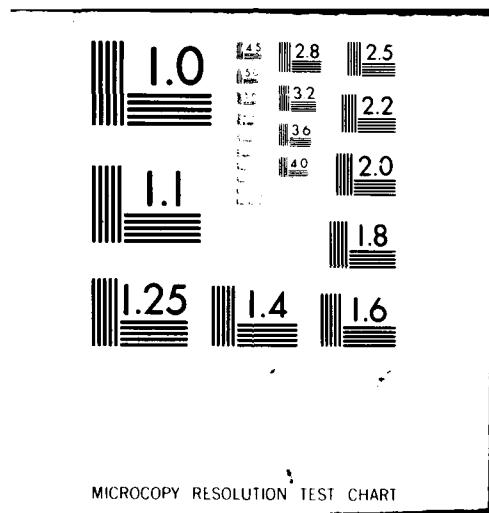
AVCO SYSTEMS DIV WILMINGTON MA  
MINUTEMAN III/MARK 12A REENTRY VEHICLE CARBON-CARBON NOSETIP PR-ETC(U)  
F04704-80-C-0011

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UNCLASSIFIED AVSD-0125-80-CR

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MICROCOPY RESOLUTION TEST CHART

NATIONAL INSTRUMENTS

ADA098593

SYSTEMS DIVISION  
31 LOWELL STREET, WILMINGTON, MASSACHUSETTS 01887

TEL: (617) 657-2433

15 April 1980  
S300-DJM-80-68

PLS-5

Department of the Air Force  
Ballistic Missile Office  
Norton Air Force Base  
San Bernardino, CA 92409

Attention: MNNR/Captain G. Parnell

Gentlemen:

Subject: Transmittal of Avco Document AVSD-0125-80-CR,  
General Test Report, MMIII/MK12A Reentry Vehicle,  
Carbon/Carbon Nosecap Production, dated 14 April 1980.  
Contract F04704-80-C-0011

Reference: A. Subject Contract, Attachment 1, Task 4.2.1.1  
B. CDRL Sequence Number 081A2  
C. CDRL Sequence Number 080A2

The subject document is transmitted herewith in accordance with Reference A and in compliance with Reference B and as formatted in Reference C.

Avco requests that BMO review and approve this document within thirty (30) days.

Very truly yours,



D. J. McQueen  
Program Manager

TIC  
MAY 7 1981

A

cc: (w/o enclosure): Avco/SD, Attention: Mr. D. J. Sullivan, Contracts Adm.  
BMO/MNCA-1, Attention: Mr. G. Howard Kirk

Enclosure: Subject Document

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Ballistic Missile Office  
Norton Air Force Base  
San Bernardino, CA 92409  
Attention: MNNR

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Attention: D. L. Maybuth  
505 King Avenue  
Columbus, Ohio 43201 (1)

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Letter on file

9 GENERAL TEST REPORT 1 Jan - Mar 80

PRODUCTION LOT SAMPLING

11 AVSD-0125-80-CR

6 MINUTEMAN III/MARK 12A REENTRY VEHICLE  
CARBON-CARBON NOSETIP PRODUCTION

CONTRACT 104704-80-C-0011

CDRL SEQUENCE NUMBER 081A2

(REPORT PERIOD 1 JANUARY 1980 - 31 MARCH 1980)

11 14 APR 1980

15 14 APR 1980-8X-2-0011  
Prepared By

AVCO SYSTEMS DIVISION  
201 Lowell Street  
Wilmington, Massachusetts 01887

Prepared For

DEPARTMENT OF THE AIR FORCE  
BALLISTIC MISSILE OFFICE  
Norton Air Force Base  
San Bernardino, California 92409

This document has been approved  
for what release and sole; its  
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404182-001

## FOREWORD

As required one (1) densified billet out of each thirty-six (36) processed is randomly selected and subjected to the Production Lot Sampling Tests specified in paragraph 5.2.3 of the Equipment Test Plan, AVSD-0115-80-CR, dated 4 April 1980. This particular PLS (#5) was taken from General Electric Densification Lot number 6. The ten (10) nosetip assemblies delivered under the subject contract were taken from this lot. All of the test results obtained were within specification limits and there are no anomalies to be reported. All data has been compiled on previously presented Figures 7, 8, and 9 from the Equipment Test Plan, and included herein as the General Test Report, Production Lot Sampling, in accordance with CDRL Sequence Number 081A2.

PLS SUMMARY DATA SHEET  
TYPE II CARBON/CARBON BILLET

BILLET S/N K900046 (PLS #5)

PREFORM S/N (P1441A) F900852

DENSIFICATION LOT(S) 6

BILLET SIZE 8.059 x 3.237 x 3.237

BILLET WEIGHT 2728.1 grams

BULK DENSITY 1.971 gms/cc

RADIOMETRIC DENSITY

EDGE TO CORE RATIO 0.9978

END TO END GRADIENT 0.0008

SIDE TO SIDE GRADIENT 0.015

OPEN POROSITY 4.41%

FRACTURES (X) None  
& INCLUSIONS (Y) None

VISUAL INSPECTION Accept

PREFORM DATA SUMMARY

MISSING/DISPLACED YARN  
BUNDLES (Z) None

FIBER ORIENTATION W/In 2°

Z AXIS BENDING None

Z ELEMENT SPACING W/In ± .005

XY LAYER SPACING W/In ± .002

BULK DENSITY 1.081 gms/cc

DENSITY GRADIENT 0.064 gm/cc

PLS SUMMARY DATA SHEET  
MECHANICAL PROPERTIES - TYPE II CARBON/CARBON BILLETS

BILLET S/N K900046 (P1441A) PLS #5

<u>PROPERTY</u>	<u>TEST SPECIMEN</u>	<u>TEST VALUE</u>	<u>REQUIREMENT (MIN.)</u>
<b>ULTIMATE TENSILE STRENGTH</b>			
X	TX-1	<u>27600</u>	18200 PSI
	TX-2	<u>33800</u>	
	TX-3	<u>30200</u>	
	TX-4	<u>32500</u>	
Z	TZ-1	<u>27200</u>	16500 PSI
	TZ-2	<u>26800</u>	
	TZ-3	<u>28500</u>	
<b>TENSILE MODULUS</b>			
X	TX-1	<u>15.0</u>	$8.5 \times 10^6$ PSI
	TX-2	<u>13.6</u>	
	TX-3	<u>15.1</u>	
	TX-4	<u>14.5</u>	
Z	TZ-1	<u>12.3</u>	$9.4 \times 10^6$ PSI
	TZ-2	<u>11.8</u>	
	TZ-3	<u>11.8</u>	
<b>COMPRESSIVE YIELD STRENGTH</b>			
X	CX-1	<u>19100</u>	15200 PSI
	CX-2	<u>18900</u>	
	CX-3	<u>18400</u>	
Z	CZ-1	<u>16900</u>	11000 PSI
	CZ-2	<u>18400</u>	
	CZ-3	<u>16900</u>	

Figure 8

PLS SUMMARY DATA SHEET  
MECHANICAL PROPERTIES - TYPE II CARBON/CARBON BILLETS

BILLET S/N K900046 (P1441A) PLS#5

<u>PROPERTY</u>	<u>TEST SPECIMEN</u>	<u>TEST VALUE</u>	<u>REQUIREMENT (MIN.)</u>
<b>COMPRESSIVE MODULUS</b>			
X	CX-1	<u>13.8</u>	$11.2 \times 10^6$ PSI
	CX-2	<u>13.0</u>	
	CX-3	<u>12.4</u>	
Z	CZ-1	<u>10.6</u>	$8.4 \times 10^6$ PSI
	CZ-2	<u>10.9</u>	
	CZ-3	<u>9.7</u>	
<b>45° XY TENSION, .1% OFFSET YIELD</b>			
	TXY-1	<u>4170</u>	3500 PSI
	TXY-2	<u>3830</u>	
<b>TORSIONAL SHEAR, .2% OFFSET YIELD</b>			
	TS-1	<u>1000</u>	950 PSI
	TS-2	<u>1030</u>	

Figure 8 (Continued)

PLS SUMMARY DATA SHEET  
TYPE II CARBON/CARBON BILLET

THERMAL PROPERTIES

BILLET S/N K900046 (P1441A) PLS#5

<u>PROPERTY</u>	<u>TEST SPECIMEN</u>	<u>TEST VALUE</u>	<u>REQUIREMENT</u>
<b>THERMAL EXPANSION</b>			$\Delta L/L \times 10^3$ IN/IN @ 4000°F
X @ 4000°F	TEX-1	<u>3.59</u>	3.2 TO 4.1
	TEX-2	<u>3.62</u>	
Z @ 4000°F	TEZ-1	<u>3.50</u>	3.1 TO 4.1
	TEZ-2	<u>3.59</u>	
<b>THERMAL CONDUCTIVITY</b>			BTU IN/HR FT <sup>2</sup> °F
Z @ 500°F	TCZ-1	<u>627</u>	580 - 740
Z @ 1500°F	TCZ-1	<u>460</u>	410 - 520
X @ 500°F	TCX-1	<u>901</u>	770 - 1010
X @ 1500°F	TCX-1	<u>585</u>	500 - 655

Figure 8 (Concluded)

# III-E 100%

PLS SUMMARY DATA SHEET (FOR PLS BILLETS ONLY)  
TYPE II CARTON/CARBON BILLET

BILLET S/N K900046 (PLS #5)

PREFORM S/N (P1441A) F900786

FABRIC ACCEPTANCE DATA

WEAVER Textile Products

LOT NUMBER 232

DEFECTS Accept

CONTAMINATION Accept

WEAVE CONSTRUCTION 8 Harness Satin

VOLATILE CONTENT 4.67

YARN COUNT 29 Warp 29 Fill

WEIGHT 5.188 oz./sq.yd.

THICKNESS .013

BREAKING STRENGTH 228.0 Warp 229.8 Fill

YARN ACCEPTANCE DATA

<u>TYPE</u>	<u>LOT NO.</u>	<u>TENSILE STRENGTH (PSI)</u>	<u>MODULUS X 10<sup>6</sup> PSI</u>	<u>DENIER g./900CM</u>
IM-1000 PAN (For Fabric)	118-2	405 x 10 <sup>3</sup>	57.0	13469
IM-3000 PAN (For Rods)	97-3	320 x 10 <sup>3</sup>	54.0	4618

Figure 9

DATE:  
ILME